



Office of Research Services

VIVARIUM

NIH DESIGN POLICY AND GUIDELINES





VIVARIUM

NIH DESIGN POLICY AND GUIDELINES

Administration

Stephan A. Ficca

Associate Director for Research Services

F. Anthony Clifford

Acting Director for Division of Engineering Services

John J. Pallas, P.E.

Past Assistant Director for Design and Construction Branch
Division of Engineering Services

George B. Williams, P.E.

Acting Assistant Director for Design and Construction Branch
Division of Engineering Services

Rassa Davoodpour

Principal Mechanical Engineer, Project Director,
Design and Construction Branch,
Division of Engineering Services



Vivarium

NIH Design Policy and Guidelines



Preface

The National Institutes of Health (NIH), an agency of the United States federal government, is dedicated to advancements in biomedical research to further knowledge about the cure and prevention of human disease. The organizational components of NIH are referred to as Institutes, Centers or Divisions (ICD). These ICDs conduct their biomedical research programs primarily at the NIH Bethesda, Maryland campus. The Office of Management has within its organization divisions that provide expertise in planning, design, architecture, engineering, construction, maintenance, safety, security, procurement, logistics, and contracts for the maintenance, renovations, and construction of new facilities. The Design and Construction Branch (DCB) of the Division of Engineering Services (DES) is responsible for the design and construction of facilities at the NIH.

The DES, along with selected consultants, was tasked with the responsibility of reviewing existing biomedical facility guidelines and related studies and creating a new set of guidelines for the NIH which would reflect the latest developments in facility planning and operation technology. Within the Office of Director, NIH, the Office of Management (OM) is the organization component that handles planning, architectural/engineering design, construction, maintenance, safety, security, procurement, logistics, and renovations at NIH.

Committees covering the disciplines of architecture, structure, mechanical systems, electrical systems, plumbing, fire protection, controls, civil and environmental matters met over an 8-month period to merge, edit, and create documents from various sources. The primary sources of information were the Generic Technical Criteria document (developed as part of the Program of Requirements for the Clinical Center Complex Renewal Program and formulated by the DES Special Project Office), the original Design Policy and Guidelines (the "Rosebook," developed by the DES Facilities and Planning Branch), and the Design Guidelines (developed by the DES Facilities Planning Office).

In conjunction with these new guidelines, the NIH Architectural/Engineering Checklist and Standard Details have been developed. The NIH Design Policy and Guidelines consists of Text Volumes identified by building type, Data Sheets specific to space or activity functions, Guideplates suggesting functional groupings, and Reference Materials pertinent to the federal biomedical, vivarium, and research hospital facilities. This collective information must be incorporated into the basis of design for all new construction and renovation projects at NIH.



Introduction

The new NIH Design and Policy Guidelines have been developed to provide minimum criteria to assist architects, planners, and engineers in the process of designing research, vivarium, and clinical center facilities for the NIH. These guidelines establish basic parameters only and are not meant to be restrictive. The NIH recognizes that an essential aspect of the design professional's responsibility is originality and imaginative design.

The NIH requires that all projects be planned and designed using a total environmental approach, including attention to site, structure, massing, circulation, visual harmony, and open areas. The combination of these relationships creates a product that is both functional and aesthetic. The architect/engineer must adapt these criteria to meet needs requested by users or imposed by specific site conditions or functional relationships. It is extremely important to recognize that the user is an essential part of this process and is integral to its success.

It is assumed that the selected architect/engineer and his or her consultants will be professionals knowledgeable in the design of these types of facilities. They will be required to assure that each specific project complies with all established codes, regulations, and current practices. These guidelines do not relieve the architect/engineer of their responsibilities as design professionals. Rather, they are intended to supplement the design process and to consolidate established policies and guidelines developed at the NIH based on operational experience. These guidelines have been devised to assist with establishing greater consistency among the facilities as well as offering the Architect/Engineer assistance with designing to NIH preferences.

The structure of the Design Policy and Guidelines is based on facility type and has been separated into four volumes of information as follows:

Research Laboratory Design Policy and Guidelines
Vivarium Design Policy and Guidelines
Clinical Center Design Policy and Guidelines
Reference Material for the Design Policy and Guidelines

The Clinical Center Design Policy and Guidelines refer specifically to the NIH Clinical Center research hospital located on the Bethesda campus. This facility is the primary focus of the NIH and houses many laboratory, vivarium and administrative areas in addition to the hospital function.



Use of the Guidelines

These guidelines define minimum standards by which architects and engineers shall design facilities on the NIH intramural campuses. These campus areas include the Main NIH Campus in Bethesda, the NIH Animal Center in Poolesville, the NIEHS Campus in North Carolina, and the Rocky Mountain Laboratory Campus in Montana. The Research Laboratory and Vivarium volumes are to be used for both new construction and renovation. The Clinical Center volume is to be used only for renovations of the existing Clinical Center.

These volumes of the guidelines have been organized into sections from general to specific requirements as follows:

- A. Introduction
- B. Planning Goals and Objectives
- C. Space Descriptions
- D. Design Criteria
- E. Room Data Sheets
- F. Appendix

Sections A. through D. provide the basic policy and guidelines in text format. Section E., the Room Data Sheets section, provides detailed data requirements for all types of spaces associated with research, vivarium and the Clinical Center. Section F, Appendix, lists the acronyms, units of measure associated with the document, and the committees, contributors, and founders that were instrumental in creating the guidelines.

The final volume collects all relevant reference material or describes reference material required for the design and construction of all types of NIH facilities. Included in this volume is the A/E Checklist, which lists the services that may be required by phase for projects at NIH.

The primary focus of these guidelines is to assist in standardizing the design approach to new and existing facilities on the Bethesda campus. The Clinical Center volume is based solely on the Clinical Center and its existing functions and spaces.

This document is intended to be used by all divisions within the Office of Research Services, primarily the branches and offices of the Division of Engineering Services.



Table of Contents

PageNo.

Preface

Preface	i
Introduction	ii
Use of the Guidelines	iii

A. Introduction

A.1 Mission Statement	1
A.2 User Input	2

B. Planning Goals and Objectives

B.1 Quality of Life	1
B.1.1 Animal Housing/Holding	2
B.1.2 Natural Light	2
B.1.3 Lighting/Illumination	2
B.1.4 Noise	2
B.1.5 Graphics/Signage	2
B.1.6 Other Amenities	3
B.2 Flexibility and Adaptability	4
B.2.1 Accessibility	4
B.2.2 Expansion/Renovation Considerations	4
B.3 Planning Module	5
B.3.1 Structural Bay Spacing	5
B.3.2 Systems/Services	5
B.4 Zoning of the Vivarium Building	6
B.4.1 Circulation/Flow of People/Animals/Materials	7
B.4.2 Security	7
B.4.3 Loading Docks	7

C. Space Descriptions and Requirements

C.1 Housing/Holding Areas	1
C.1.1 Small Animals	3
C.1.2 Large Animals	3
C.1.3 Cubicle Housing	4
C.2 Special-Purpose Spaces	5
C.2.1 Procedure Rooms	5
C.2.2 Containment Suites	5
C.2.3 Surgical Suites	5
C.2.4 Pharmacy	7
C.2.5 Radiographic Suite	7
C.2.6 Diagnostic Laboratory	9



C.2.7	Necropsy	9
C.2.8	Animal Treatment Room	9
C.2.9	Receiving and Examination Room	9
C.2.10	Quarantine Area	10
C.2.11	Vestibules	10
C.2.12	Cage Wash	10
C.2.13	Storage	12
C.3	Office and Shared-Use Areas	13
C.3.1	Offices	13
C.4	Transitional Zone	14
C.4.1	Break Areas	14
C.4.2	Other Support Space	14
C.5	Administration and Management Support Zone	15
C.5.1	Administration Areas	15
C.5.2	Offices	15
C.5.3	Conference Rooms	15
C.6	Building Operational Areas	16
D.	Design Criteria	
D.1	Space Requirements	1
D.1.1	Space Planning Criteria	1
D.2	Gross Area Allowance/Grossing Factors	2
D.3	The Vivarium Module	3
D.4	Circulation	4
D.4.1	Horizontal	4
D.4.2	Vertical	4
D.5	Furniture and Equipment	5
D.5.1	Casework	5
D.5.2	Chemical Fume Hoods and Biological Safety Cabinets	5
D.5.3	Equipment	6
D.6	Architectural Finishes and Materials	7
D.6.1	Floors	7
D.6.2	Walls	7
D.6.3	Ceilings	8
D.6.4	Windows and Window Treatment	8
D.6.5	Doors	8
D.6.6	Door Hardware	9
D.7	Structural	10
D.7.1	Vibration	10
D.7.2	Module/Bay Size	11
D.7.3	Floor Slab Depressions	11
D.7.4	Equipment Pathway	11



D.8	Heating, Ventilation, and Air Conditioning (HVAC)	12
D.8.1	Building Design Considerations	12
D.8.2	Energy Conservation	12
D.8.3	Systems Economic Analysis	13
D.8.4	Outdoor Design Conditions for the NIH, Bethesda	14
D.8.5	Indoor Design Conditions	14
D.8.6	Air Quality	15
D.8.7	Air Motion Criteria	17
D.8.8	Relative Pressurization	17
D.8.9	Heating and Cooling Load Calculations	19
D.8.10	Building Solar and Conduction Loads	20
D.8.11	Lighting Loads	20
D.8.12	Occupant Load	20
D.8.13	Animal Room Heat Loads	21
D.9	Plumbing	22
D.10	Electrical	23
D.10.1	Normal Power	23
D.10.2	Emergency Power	24
D.10.3	Lighting	25
D.10.4	Security	25
D.10.5	Fire Alarm	26
D.11	General Health and Safety	27
D.11.1	Physical Hazards	27
D.11.2	Emergency Safety Equipment	28
D.11.3	Gas Cylinders	28
D.11.4	Waste Storage	28
D.12	Biosafety	30
D.12.1	Biosafety Level 2 Facilities	30
D.12.2	Biosafety Level 3 Facilities	31
D.13	Radiation Safety	34
D.13.1	Background	34
D.13.2	Specific Areas of Concern	35
D.13.3	Radioactive Waste Storage	35
D.13.4	Module Requirements	38
D.13.5	Clearance for Renovation/Remodeling	38
D.13.6	HVAC Systems	39
D.13.7	Radioactive Airborne and Liquid Effluent Discharges	39
D.13.8	Vacuum Systems	41
D.13.9	Irradiators Utilized in Medical Research	42
D.14	Environmental Management	44
D.14.1	Background	44
D.14.2	Hazardous Substance Storage and Handling	45
D.14.3	Hazardous Substances Storage	46
D.14.4	Hazardous Waste Storage and Handling	47
D.14.5	Bulk Storage Facilities	48
D.14.6	Wastewater	50
D.14.7	Solid Waste	51



D.15	Fire Safety/Fire Protection	61
D.16	Pest Management	62
E.	Room Data Sheets	
E.1	Vivarium Room Data Sheets Table of Contents	1
E.2	General	2
V.1	Large Animal Holding	3
V.2	Small Animal Holding	5
V.3	Procedure Room	7
V.4	Necropsy	9
V.5	Animal Prep	11
V.6	Operating Room	13
V.7	Intensive Care/Recovery	15
V.8	Cage Wash (Clean, Dirty, Equipment Area)	17
V.9	Pharmacy	19
V.10	Scrub and Gown	21
V.11	Surgical Supply and Work Room	23
V.12	Radiographic (X-Ray Room, Control Booth, Darkroom)	25
V.13	Treatment Room and Exam Room	27
V.14	Quarantine Room	29
V.15	Cold Room	31
V.16	Locker Room	33
F.	Appendix	
F.1	Acronym List for NIH Design Policy and Guidelines	1
F.2	Units of Measure	4
F.3	Committees,Contributors, Founders	5
F.3.1	Architectural - Ad Hoc Committee	6
F.3.2	Structural - Ad Hoc Committee	7
F.3.3	Mechanical - Ad Hoc Committee	8
F.3.4	Electrical - Ad Hoc Committee	9
F.3.5	Plumbing - Ac Hoc Committee	10
F.3.6	Fire Protection - Ad Hoc Committee	11
F.3.7	Controls - Ad Hoc Committee	12
F.3.8	Environmental - Ad Hoc Committee	13
F.3.9	Civil - Ad Hoc Committee	14
F.3.10	Standard Detail - Ad Hoc Committee	15
F.3.11	A/E Checklist - Ad Hoc Committee	16
F.3.12	Style and Format - Ad Hoc Committee	17
F.3.13	Contributors	18
F.3.14	Founders	19

